

Fact Sheet

LABORATORY METHODS FOR DETERMINING EXPLOSIVES IN SOIL AND WATER

PROBLEM

An environmental problem of major concern to the U.S. Army is the presence of soil contaminated with residues of high explosives at military installations throughout the United States. This contamination has occurred over the greater part of this century by waste discharges from manufacturing of explosives and fabrication of finished munitions, and from residues produced during destruction of out-of-specification materiel, destruction of out-of-date bombs, rockets and ammunition, and utilization of munitions at Army training sites. The principal components in these residues are TNT, RDX, and tetryl, the major high explosives used by the Army during the last 50 years.

In addition to the chemicals intentionally added to explosives formulations, these residues contain a complex mixture of manufacturing impurities and environmental transformation products. The first step in remediation is to characterize contaminated soils and groundwater to assess the degree and types of contamination present. An analytical method was needed for this determination, but the chemicals present in these residues were too thermally unstable and polar to be analyzed by either the volatile or semi-volatile methods developed by the EPA.

SOLUTION

The U.S. Army Cold Regions Research and Engineering Laboratory, in conjunction with the Army Environmental Center, has developed laboratory methods for the determination of explosives in soil and groundwater. These methods are based on high-performance liquid chromatography, which is particularly suited to the analysis of chemicals that are thermally unstable. These methods were subjected to ruggedness testing, a statistically based collaborative study, and extensive testing with field-contaminated samples. The results were so favorable that these methods have been adopted as EPA SW846 Standard Method 8330 and ASTM Method D5143-90. These methods currently are the industry standard and are in common use at government laboratories and in contractor laboratories conducting analyses for the Army and the EPA.

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